

DD WRT Virtual Access Point

These are my personal notes so not very well redacted, feel free to make a better version.

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Introduction

A Virtual Access Point (VAP) is an extra virtual interface created on the same radio with a different Wireless Network Name (SSID).

The VAP is created on the same radio as the master interface, so it shares a lot of its properties e.g. same channel, but it can have a different password.

This is often used as a wireless guest network, for security reasons, routing reasons, or QoS reasons.

Depending on your needs you can separate the VAP from your main Network e.g. for Guest Network, this is called an **unbridged setup**, you then have different subnets which can be isolated from each other.

If you want clients of the VAP to see your main network then choose the simple **bridged setup**, this can be useful if you set your kids on this separate VAP and then turn it off at certain times (Radio scheduling).

A lot of [instructions/wiki's](#) are old and sometimes outdated, if you followed those it is recommended to start fresh so to reset to defaults first.

If you create your VAP on a on a **Wireless Access Point (WAP)**: a secondary router connected wired LAN<>LAN on the same subnet as the primary router, then first setup as a proper WAP and follow [the instructions further down](#). For a WAP there are also a lot of old and outdated instructions so if you have already used other instructions then best to reset to defaults and start fresh.

The [Simple Setup](#) is for adding just a single VAP, if you want to have more interfaces and or VLAN's tied together then use the [Bridge Setup](#).

Simple Setup

Simple Bridged Setup (all clients can see each other)

A simple VAP can be made on the Wireless/Basic Setup Tab, just click on the Add button.

Regulatory Domain	UNITED_STATES	▼
Regulatory Mode	Off	▼
TPC Mitigation Factor	0 (Off)	▼

Wireless Interface wl0 [2.4 GHz/5 GHz] - Max Vaps(16)

Physical Interface wl0 - SSID [E2000] HWAddr [00:25:9C:4D:0A:D0]

Wireless Mode	AP	▼
Wireless Network Mode	NG-Mixed	▼
Wireless Network Name (SSID)	E2000	⋮
Wireless Channel	11 - 2.462 GHz	▼
Channel Width	20 MHz	▼
Wireless SSID Broadcast	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	
Sensitivity Range (ACK Timing)	1350	(Default: 500 meters)
Wireless GUI Access	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	
Multicast To Unicast	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	
Network Configuration	<input type="radio"/> Unbridged <input checked="" type="radio"/> Bridged	

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Virtual Interfaces

Virtual Interfaces wl0.1 SSID [dd-wrt_vap] HWAddr [02:25:9C:4D:0A:D1]

Wireless Network Name (SSID)	dd-wrt_vap	⋮
Wireless SSID Broadcast	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	
Wireless GUI Access	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	
Network Configuration	<input type="radio"/> Unbridged <input checked="" type="radio"/> Bridged	
AP Isolation	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	

Remove Copy Paste

Add Virtual AP

After creating the VAP head over to the **Wireless Security page** and set the wireless security for the VAP. For most routers wireless security must be set the same as for the primary interface (recommended is WPA2 Personal / CCMP-128 (AES)).

If you want communication between your VAP and you existing network keep it Bridged under Network Configuration.

Separate Unbridged Setup

If you want the VAP separated from your main network (and if used for guest you do not trust, you should) then tick **Unbridged**.

Virtual Interfaces **wl0.1 SSID [dd-wrt_vap] HWAddr [02:25:9C:4D:0A:D1]**

Wireless Network Name (SSID)	<input type="text" value="dd-wrt_vap"/>
Wireless SSID Broadcast	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Wireless GUI Access	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Network Configuration	<input checked="" type="radio"/> Unbridged <input type="radio"/> Bridged
Multicast forwarding	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Masquerade / NAT	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Filter WAN NAT Redirection	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Net Isolation	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Forced DNS Redirection	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
IP Address	<input type="text" value="192"/> · <input type="text" value="168"/> · <input type="text" value="2"/> · <input type="text" value="1"/> / <input type="text" value="24"/>
AP Isolation	<input checked="" type="radio"/> Enable <input type="radio"/> Disable

Remove Copy Paste

Add Virtual AP

The unbridged VAP must use a different IP subnet, e.g. the IP address must be **different** i.e. outside the range of your main network (which is the default 192.168.1.1/24).

As we normally use a netmask of /24, that means the third number of the IP address should be different from the routers Local IP e.g. 192.168.**2**.1 while the routers Local IP is 192.168.**1**.1

If you do not want that the wifi clients on the guest VAP can see each other than tick **AP Isolation: Enable**.

In this example the **Wireless GUI Access** is **Disabled** but enabling Net Isolation already disables GUI access.

If you do not want the clients on the guest VAP to see your home Network tick **Net Isolation: Enable** (recommended setting, **you need at least build 49934**, earlier builds had a bug which prevents proper isolation).

Note: Net isolation only isolates between main subnet (br0) and VAP.

If you have more than one VAP the VAP's are not automatically isolated from each other and you have to do that [manually](#)

If you want a different DNS server for your VAP clients you can specify one after you have **enabled** "Forced DNS redirection"

Save and Apply and **wait at least two minutes before proceeding** to give the router time to restart the necessary services.

After creating the VAP head over to the **Wireless Security page** and set the wireless security for the VAP. For most routers wireless security must be set the same as for the primary interface (recommended is WPA2 Personal / CCMP-128 (AES)).

Now head over to the **Setup/Networking** tab, scroll to the bottom and click on Add, to add a DHCP server, which you bind to wl0.1 (**for Atheros routers it is wlan0.1**).

For easier use with CIDR notation set the start address at 64 for a max number of users of 64.

Network Configuration wl0.1

MAC Address

02:25:9C:4D:0A:D1

Label

TX Queue Length

1000

Bridge Assignment

☒ Unbridged ☐ Default

MTU

1500

Multicast forwarding

☐ Enable ☒ Disable

Masquerade / NAT

☒ Enable ☐ Disable

Filter WAN NAT Redirection

☐ Enable ☒ Disable

Net Isolation

☒ Enable ☐ Disable

Forced DNS Redirection

☐ Enable ☒ Disable

IP Address

192 . 168 . 2 . 1 / 24

DHCPD

Multiple DHCP Server

IP Address	Interface	Enable	Start	Max	Lease time	
None	wl0.1 ▾	On ▾	64	64	1440	🗑

Add

Save

Apply Settings

Cancel Changes

Note: when a VAP is setup on a [Wireless Access Point](#), you will not see settings related to WAN.

After you are done: REBOOT!

Very important, when you are done you have to reboot otherwise you will not get a DHCP address

Note: Setup> Basic Setup > Optional Settings > Shortcut Forwarding Engine (SFE) is not compatible with VAP. It should be automatically disabled but this does not always happen on Broadcom routers, so disable it manually.

References:

@jwh's guide: https://www.dd-wrt.com/wiki/index.php/Guest_Network

<https://sploitworks.com/bbs/showthread.php?tid=3>

<https://flashrouters.zendesk.com/hc/en-us/articles/115000967873-How-To-Setup-a-DD-WRT-Guest-Wireless-Network-On-Your-FlashRouter>

Isolating VAP's:

Net Isolation

If you Enable "Net Isolation" the VAP/Bridge is isolated from the Main network.

AP Isolation

If you want to isolate the wifi clients on the VAP from each other you can Enable "AP Isolation"
This setting is only available directly on the wlan interface and works bridged and unbridged.

Manual Settings

<https://pastebin.com/r4u62P0B> , (you do not need the nat rule)

https://wiki.dd-wrt.com/wiki/index.php/Multiple_WLANs

When "Net Isolation" is enabled the VAP/Bridge is isolated from the Main network but if you have multiple VAPs/Bridges those are not isolated from each other, you have to do that manually:

VAPx is e.g. wl0.1, wlan1.1, br1 etc:

```
iptables -I FORWARD -i <VAP1> -o <VAP2> -m state --state NEW -j REJECT
```

```
iptables -I FORWARD -i <VAP2> -o <VAP1> -m state --state NEW -j REJECT
```

If you do want your VAPs to have local access but no Internet access than Disable Net isolation.

You can either Disable NAT on the interface (Setup/Networking) or use an iptables rule:

```
iptables -I FORWARD -i <VAPx> -o $(get_wanface) -j REJECT
```

Very useful are the instructions from @eibgrad: <https://pastebin.com/r4u62P0B>

Also with examples to give access to some clients e.g. printers on your main network

Bridge Setup

When you want to have more than one interface as Guest e.g. a second Wireless interface or ethernet ports (VLAN), you can tie this altogether on a newly made bridge.

Start with making the new bridge

On Network tab

Under Create Bridge click **Add** and name the bridge *br1*

Create Bridge

Name	STP	IGMP Snooping	Prio	Forward Delay	Max Age	MTU
br0	Off	Off	32768	15	20	1500
br1	STP	Off	32768	15	20	1500

Add

Save and Apply

After waiting at least two minutes to give the router time to restart necessary services, scroll down this page to the newly made bridge and give it an IP address different from the Local IP address, as we are using /24 subnet the third number (here 71) has to be different!

Enable Net isolation if this is for Guest/IoT access and you do not want guests on your regular network

Network Configuration br1

Label

TX Queue Length

1000

MTU

1500

Multicast forwarding

☐ Enable ☒ Disable

Masquerade / NAT

☒ Enable ☐ Disable

Filter WAN NAT Redirection

☐ Enable ☒ Disable

Net Isolation

☒ Enable ☐ Disable

Forced DNS Redirection

☐ Enable ☒ Disable

IP Address

192 . 168 . 71 . 1 / 24

L2Mesh enable

☐

L2Mesh Bridge

br0

Save and Apply

Scroll down to the bottom of this Networking page and add a DHCPD server for br1, I use start at 64 for 64 leases (useful when doing things like Policy Based Routing).

DHCPD

Multiple DHCP Server

IP Address	Interface	Enable	Start	Max	Lease time
192.168.71.1/24	br1	On	64	64	1440

Add

Now head back to the **Wireless Basic Setup** page and add one or more VAP's.
Leave the VAP's at default so leave them **bridged!**

Virtual Interfaces

Virtual Interfaces wl0.1 SSID [dd-wrt_vap_24] HWAddr [CE:40:D0:62:F6:3D]

Wireless Network Name (SSID)

dd-wrt_vap_24

Wireless SSID Broadcast

☒ Enable ☐ Disable

Wireless GUI Access

☒ Enable ☐ Disable

Multicast To Unicast

☐ Enable ☒ Disable

Network Configuration

☐ Unbridged ☒ Bridged

AP Isolation

☐ Enable ☒ Disable

Remove

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Add Virtual AP

Virtual Interfaces wl1.1 SSID [dd-wrt_vap_5] HWAddr [CE:40:D0:62:F6:4E]

Wireless Network Name (SSID)

dd-wrt_vap_5

Wireless SSID Broadcast

☒ Enable ☐ Disable

Wireless GUI Access

☒ Enable ☐ Disable

Multicast To Unicast

☐ Enable ☒ Disable

Network Configuration

☐ Unbridged ☒ Bridged

AP Isolation

☐ Enable ☒ Disable

Remove

Copy

Paste

Save and Apply

Head over to the **Wireless Security** page and setup wireless security as **WPA2 PSK** (Personal) with **CCMP-128 (AES)** for all interfaces.

Virtual Interfaces wl0.1 SSID [dd-wrt_vap_24] HWAddr [CE:40:D0:62:F6:3D]

Security Mode	WPA2-PSK	
WPA Algorithms	CCMP-128 (AES)	
WPA Shared Key	••••••••	<input type="checkbox"/> Unmask
Key Renewal Interval (in seconds)	3600	

Now head back to the **Networking** page

Under Assign to Bridge Add both wl0.1 and wl1.1 (for Atheros they are wlan0.1 and wlan1.1) to br1

Assign to Bridge

Assignment	Interface	STP	Prio	Path Cost	Hairpin Mode
br1	wl0.1	On	128	100	<input type="checkbox"/>
br1	wl1.1	On	128	100	<input type="checkbox"/>

Add

Save and Apply

After you are done a reboot is recommended

DNS

By default your clients will receive the DNS address of the VAP/bridge as their DNS server, DNSMasq will take it from there. So there is no need to set any DNS servers or make DNS related settings!

If you want to use another DNS server for your unbridged VAP/Bridge then you can use *Forced DNS Redirection*. This uses iptables rules to DNAT traffic on port 53 to the desired DNS-server. Alternatively you can set in Additional DNSMasq options:
`dhcp-option=br1,option:dns-server,1.1.1.1,1.0.0.1`

VAP on a WAP

If you place the unbridged VAP on a Wireless Access Point (WAP):

A secondary router connected wired LAN<>LAN on the same subnet as the primary router.

Setup:

- On Basic Setup page:
 - WAN disabled
 - DHCP server Disabled (=off and NOT set as Forwarder!)
 - Local IP address in subnet of primary router but outside DHCP scope, make sure the used IP address is unique on your network you cannot have duplicates.
You can run udhcpd to give the WAP a static lease but because you can it doesn't mean you should ;)
 - Gateway **and** Local DNS pointing to primary router
Example:
If your primary router is 192.168.1.1 then set the Local IP address of the WAP to 192.168.1.2 (make sure that is not used).
The Gateway and Local DNS are set to point to the primary router e.g.: 192.168.1.1
- Keep DNSMasq enabled (both on Basic Setup page and Services page)
- On Setup > Advanced Routing, keep Operating mode in the default **Gateway** (the wiki says Router mode but do not do that, either it does not matter (this case) or break things)
- On Security > Firewall keep the **SPI Firewall enabled**, although you do not want a firewall it will be automatically disabled as there is no WAN so no need to change this setting from default.
- Connect LAN <> LAN (**do not use the WAN port** unless you really need that extra port, for most routers traffic still must use the CPU so performance is lacklustre and there are some routers where the WAN port is not added to br0 so the WAN port could be non-functional on some routers).

Note: For Broadcom routers for best throughput enable CTF on Basic Setup Page

If you have unbridged interfaces on the WAP (Virtual Access Point (VAP), bridg, vpn server or vpn cliente etc.), you have to add the following rule to the firewall in order to get internet access.

In the web-interface of the router (**the WAP**): Administration > Commands save Firewall:

#Always necessary (alternatively set static route on main router and NAT traffic from VAP/Bridge out via WAN):

```
iptables -t nat -I POSTROUTING -o br0 -j SNAT --to $(nvram get lan_ipaddr)
```

If you want to only have the VAP/bridge to have internet access and not access to the rest of the network

#Replace with the appropriate interface of your VAP, e.g. wl0.1, wlan0.1 etc:

```
GUEST_IF="wlan1.1"
```

#Net Isolation does not work on a WAP so keep it disabled, add for isolating VAP from main network:

```
iptables -I FORWARD -i $GUEST_IF -d $(nvram get lan_ipaddr)/$(nvram get lan_netmask) -m state --state NEW -j REJECT
```

#For isolating the WAP itself from the VAP/bridge:

```
iptables -I INPUT -i $GUEST_IF -m state --state NEW -j REJECT
```

```
iptables -I INPUT -i $GUEST_IF -p udp --dport 67 -j ACCEPT
```

```
iptables -I INPUT -i $GUEST_IF -p udp --dport 53 -j ACCEPT
```

```
iptables -I INPUT -i $GUEST_IF -p tcp --dport 53 -j ACCEPT
```

To make it simple and isolate the VAP/bridge from all know private subnets which isolate it not only from the main network but also from other bridges:

```
iptables -I FORWARD -i $GUEST_IF -d 192.168.0.0/16 -m state --state NEW -j REJECT
```

```
iptables -I FORWARD -i $GUEST_IF -d 10.0.0.0/8 -m state --state NEW -j REJECT
```

```
iptables -I FORWARD -i $GUEST_IF -d 172.16.0.0/12 -m state --state NEW -j REJECT
```

If you have a lot of VAP's bridges you can make a loop e.g.:

```
for GUEST_IF in br1 br2 br3
```

```
do
```

```
    iptables -I FORWARD -i $GUEST_IF -d $(nvram get lan_ipaddr)/$(nvram get lan_netmask) -m state --state NEW -j REJECT
```

```
done
```

#Isolate the VAP/bridges from each other

```
iptables -I FORWARD -i br1 -o br2 -m state --state NEW -j REJECT
```

```
iptables -I FORWARD -i br2 -o br1 -m state --state NEW -j REJECT
```

Sometimes you see duplicate rules depending on how often the firewall restarts if that is a problem precede the rules with `-D` instead of `-I`.

note:

When the Wan is disabled VLAN 1 and VLAN2 are just bridged but on the switch level (swconfig) the VLANs are still separated

References:

@mrjcd's guide: <https://forum.dd-wrt.com/phpBB2/viewtopic.php?p=1047143#1047143>

https://wiki.dd-wrt.com/wiki/index.php/Guest_Network#VAP_with_no_WAN

ALternative DNSMasq method: https://wiki.dd-wrt.com/wiki/index.php/Guest_Network#New_DNSMasq_Method

@eibgrad's isolation: <https://pastebin.com/r4u62P0B>